

NIF Construction through El Niño. NIF construction increased markedly in January and February as conventional facility construction crews began double shifts to compensate for the heavy rains in November and December 1997. Although the January rainfall was heavy, wet weather mitigation actions taken in December, such as mixing limestone into the topgrade soil to minimize water penetration, allowed work to progress without serious impact. Productivity is achieved immediately after heavy rainfall, and in some cases during a light rainfall or sudden cloud burst. Construction crews have adjusted to the wet weather, and the huge facility is quickly taking shape as shown below.

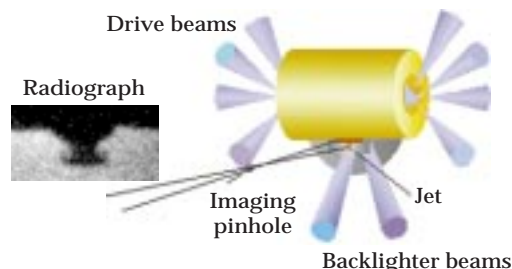


NIF Target Area retaining wall forms and rebar.

ICF Optics Area Subcontract Awarded. A construction subcontract, awarded to Dome Construction, covers conversion of the Nova Two-Beam facility into the ICF Optics Processing Development Area. Following the last Two-Beam experiment on November 12, 1997, the experimental equipment was disassembled and stored for future use. Optics processing will begin in late 1998.

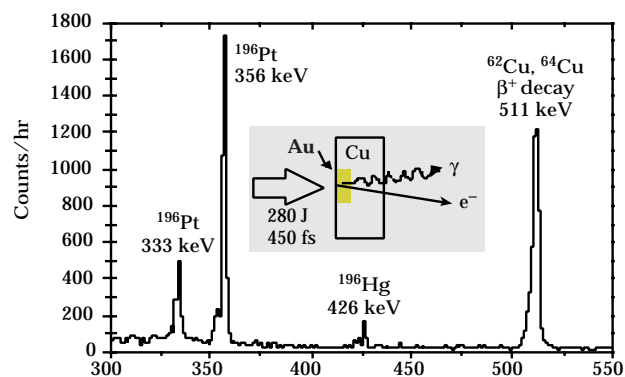
Nova Experiments Emulate Supernovae. The use of high-energy-density physics experiments for laboratory astrophysics continues to draw considerable attention from university researchers. Recently, we obtained the first Nova radiographs of a 3D supernova-like feature. To examine the effects of such features, we developed a target in which the initial perturbation was a cylindrically symmetric dimple machined in copper. An equivalent 2D perturbation is a "ripple." When driven by a hohlraum, both perturbations invert and grow. The tip of the 3D jet grows significantly faster (i.e., has a higher tip velocity) than a 2D ripple of the same wavelength. Because of its symmetry, however, the jet

(see radiograph below), unlike more complex 3D structures, can still be simulated with 2D astrophysical computer codes. These experiments are part of a collaboration with researchers from the University of Arizona, University of Colorado, and University of Michigan.



Radiograph (the black protrusion is the "jet") and experimental setup.

Petawatt Demonstrates Transmutation with a Laser-Produced Plasma. As part of a series of laser-matter experiments, the Petawatt laser has produced, in gold and copper targets, bremsstrahlung radiation (x rays from laser-accelerated electron/atom collisions, see insert in figure below) that exceeds the threshold for photon-induced nuclear reactions. The presence of photonuclear reactions, such as converting atomic weight ^{197}Au to ^{196}Au , indicates a large flux of bremsstrahlung photons above the threshold energy (8.06 MeV) for this photoneutron emission reaction. The production of ^{196}Au is clearly identified by the appearance of the nuclear de-excitation gamma rays in the ^{196}Pt (daughter nuclide of ^{196}Au) at 356 keV and 333 keV. In addition, the less probable beta-decay of ^{196}Au to ^{196}Hg is also identified by the line at 426 keV. A typical gamma-ray energy spectrum for an activated target is shown below.



Photoneutron activation of gold (Au) and copper (Cu) target material.

For comments about content of the *Monthly Highlights*, contact Don Correll (510) 422-6784.

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